

## THE BRUSH-TAILED OPOSSUM OF KANGAROO ISLAND, SOUTH AUSTRALIA

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### SUMMARY

*Trichosurus vulpecula* from Kangaroo Island is compared in series with the animal from the adjacent mainland of the Adelaide district and is found to be subspecifically distinct, and named *T. v. raiti*. The evidence is presented in detail.

### INTRODUCTION

In his treatment of *Trichosurus vulpecula* Kerr in the "Mammals of South Australia", Wood Jones (1924, pp. 196-203) gave a succinct account of what he considered were the essential differences which separated the animal of Kangaroo Island from that of the adjacent mainland. He was especially familiar with the island form through his intimate connection with Flinders Chase and his frequent visits to that sanctuary at the western end of the island, where for a time the dense opossum population was kept within bounds by an annual snaring for the fur market.

It is clear from his account that he regarded the Kangaroo Island opossum as a distinct geographical subspecies, as he compared and contrasted it with what he called "the typical variety as it occurs round Adelaide". He did not, however, give a formal definition nor apply a distinguishing trinomial to it, and there now seems reason to believe that the prepared specimen on which he chiefly relied for his description was somewhat atypical of the population (*infra*).

In August, 1928, the present writer made a visit to the Chase in company with the Taxidermist of the South Australian Museum, and with the assistance of the then Ranger, Mr. Harold Hansen, collected a satisfactory series of opossums, which were measured and weighed in the flesh and preserved in the conventional ways. This collection was deposited in the South Australian Museum and, together with specimens in my own possession, forms the basis of the present account.

The question of what are the true characters of the "typical", primary, or nominate race of *T. vulpecula* is easier to ask than to answer, and many similar questions continue to bedevil the trinomial treatment of early described species which like it have no surviving holotypes nor modern descriptions. That it came from the immediate or near vicinity of Sydney in New South Wales is probable but the currently accepted view, which stems from Iredale and Troughton (1934, pp. 30-31), that *T. vulpecula vulpecula* occurs over the greater part of south-eastern Australia, including southern Queensland, New South Wales, Victoria and South Australia, is more in the nature of a working hypothesis than an established fact.

However, this uncertainty does not invalidate the real differences which separate the two populations studied by Wood Jones which have been amply confirmed and extended in the present work, and which appears to place the Kangaroo Island form morphologically further from that of New South Wales as far as it is known, than from that of the Adelaide district. Unlike most other present day insular occurrences of the species in South Australian waters, which are either known to be due to deliberate introduction or are under suspicion of such, the Kangaroo Island population is undoubtedly indigenous, of large extent both numerically and territorially and of homogeneous character. It has been isolated from that of the adjacent mainland for a period generally estimated at 10,000 years at least, and possibly much longer. To continue to deny it trinomial distinction is more likely to confuse the general overall conception of the radiation of the species, than to clarify it, and for these reasons I propose to define it as follows:

*Trichosurus vulpecula raii*<sup>1</sup> subsp. nov.

An insular subspecies from Kangaroo Island, St. Vincent Gulf, South Australia.

General characters similar to those of the population of the Adelaide district and south Mt. Lofty Range of the adjacent mainland (currently regarded by authors as representing *T. vulpecula vulpecula* Kerr), but distinguished by its larger size, richer pelage, and somewhat darker and colder dorsal colouration. The dark markings of the head and hind foot are larger, more saturate and conspicuous, and the black portion of the tail brush is longer.

The skull is longer, relatively narrower and with narrower nasal bones, and shows other differences noted below.

In the dentition, the molar rows are longer,  $Ms^{1-3}$  in adults yielding an approximate mean of 15.1 mm. as against 13.9 mm. on the mainland.

*Type Locality*: The scrubs of Rocky River in the sanctuary of Flinders Chase at the western end of the island.

*Type*: Filled skin and skull of a young adult ♂, South Australian Museum, registered number M.2518. Collected August, 1928. A series of contemporary topotypes is also registered. Thirty specimens examined.

*Dimensions of Type* (for definition of dimensions see below): Head and body, 435 mm.; tail, 320; pes (total *s.u.* length), 71; pes (length of naked sole *s.u.*), 61; ear, length, 56; ear, breadth, 28; weight in grammes, 2,270.

*Skull Dimensions of the Type*: Basal length, 77.7; zygomatic breadth, 51.4; nasals, length, 34.0; nasals, greatest breadth, 14.0; interorbital constriction, 10.1; palate length, 46.0; anterior palatal foramina, 6.0; basi cranial axis, 24.4; basi facial axis, 53.5; facial index, 219;  $Ms^{1-3}$ , 15.5;  $P^1$ , 5.0.

#### EXAMINATION OF THE MATERIAL

South Australian mainland material, available for comparison with the island form, is copious, but much of it is only broadly localized and probably comes from localities considerably north of Adelaide and in drier districts where, as Wood Jones has shown, the size falls off considerably. Preliminary tests having shown it to be much too heterogeneous for treatment *en bloc*, a

<sup>1</sup> Commemorating the late F. J. Rai, for many years Taxidermist of the South Australian Museum, and a senior member of a family which has rendered conspicuous service in that craft in Australia.

restricted sample from the Adelaide-Wakefield Plain (including the urban area) and the south Mt. Lofty Range, was selected comprising about 25 specimens in good condition and sufficiently documented for the purpose.

The age criterion adopted was the closure of the basioccipital-basisphenoid suture, which, though it takes place fairly early, yet serves to exclude obviously immature examples, and gives a sample of fairly uniform size. This test reduced the Kangaroo Island series to 14 examples (7 ♂ : 7 ♀), and the Adelaide district one to 13 (5 ♂ : 3 ♀ : 5 not sexed).

#### FLESH DIMENSIONS

The range and approximate mean of seven items under this head are quoted for the Kangaroo Island series in Table 1.

(a) The head and body length represents the total length of the dorsal contour measured with a steel tape from the upper extremity of the rhinarium to the end of the tail excluding the terminal hair tuft, minus the length of tail.

(b) Tail length is from the cloaca to apex (excluding hair) measured along the ventral surface with the tail stretched at right angles to the trunk.

(c) Total pes length is the usual dimension from the extremity of the hairy heel to the extremity of the most distant apical pad and therefore excluding the claw.

(d) Length of sole of pes represents the nude portion of the above.

(e) Ear length is the distance from the bottom of the tragal notch to the apex of the pinna, taken with the zero of a rigid rule, within the notch.

(f) Ear breadth is the greatest transverse breadth across the trough of the pinna, at right angles to the above.

(g) Weights were ascertained on removing animals from neck snares approximately 6-10 hours *post mortem*.

TABLE 1

	7 Adult ♂	6 Adult ♀	Combined Adult ♂+♀
Head and body	410-460 (442)	415-485 (450)	410-485 (446)
Tail	290-350 (319)	290-340 (311)	290-350 (315)
Pes (entire <i>s.u.</i> )	62-74 (68)	60-69 (65)	60-74 (67)
Pes (nude sole only)	55-61 (57)	55-57 (56)	55-61 (57)
Ear length	53-59 (56)	52-58 (55)	52-59 (56)
Ear breadth	27-30 (28)	28-31 (29)	27-31 (28)
Weight (in grammes)	1,816-2,724 (2,335)	2,043-2,724 (2,406)	1,816-2,724 (2,370)

Range and approx. mean of flesh dimensions in *Trichosurus vulpecula rami* subsp. nov.

The question of the relation of the external dimensions of the populations from the island and the Adelaide district has had to be left in abeyance owing to lack of data for the latter, sufficiently adequate to justify a comparison. Most of the published figures for the species are doubtfully comparable with the above, having been derived from stuffed skins or by methods based on uncertain landmarks. The lengths of pes quoted in literature are particularly dubious, suggesting in some cases that the measurement made was actually of the nude portion of the plantar surface only, which (as shown above) may be a full 10 mm. less than the true dimension from the calcaneum.

Wood Jones (op. cit.) considered the island form to be larger than that of the Adelaide district and the evidence of cranial dimensions reviewed below supports this, but it should be noticed that the male measured by him is (in respect to head and body length at least) excessively large, exceeding the maxima of the series here measured by 15 p.c.

#### PELAGE

In general characters the pelage of the Kangaroo Island opossum is quite similar to that of the Adelaide district, exhibits a similar range of variation and a proportion of each series is scarcely distinguishable in this regard. There are, however, valid average distinctions, and where these are most decidedly developed the total dissimilarity may be considerable. Variation due to seasonal and age changes are marked in both groups, but if these are eliminated by confining the comparison to adults in mid-winter coat, the following distinctions hold:

(1) The dorsal pelage in the Kangaroo Island animal is darker in tone and colder in hue, the neutral grey being modified towards glaucous rather than fulvous. The length of the ivory or white subterminal band of the fur is also less and the grizzling of the dorsal coat correspondingly finer. Aged males are sometimes strongly reddened on the fore back as in the mainland animal, but the latter distinction remains.

The male described by Wood Jones (which is now in the South Australian Museum collection) is an extreme example of this secondary reddening, but a warm tawny dorsal colouration is not characteristic of the series as a whole; quite the contrary in fact.

(2) Ventrally the two series show comparatively slight differences, both being generally distinctly buffy in external colour. In the island group the colour possibly averages a little warmer, being near Ridgway's ochraceous buff in the richest examples, but the "rusty" belly mentioned by Wood Jones is only shown by one or two aged males in the present series, and is partly due to an unusual extension posteriorly of the brown colouration of the sternal gland site, which may occur in mainland examples also.

(3) There are considerable differences between the two series, in the extent and intensity of the dark markings of the head and feet. In the Kangaroo Island form the dark patch at the base of the ear backs is increased in area, so that the upper white or buff portion is sometimes reduced to a narrow strip on the posterior upper margin—the colour is generally darker and more saturate also; a dark brown black approaching jet black in some examples.

Similarly, in the pes the dark irregular markings on the tarsus and the dark fringe around the heel and on the outer margin of the foot are increased in area and density and invade the dorsum over the metatarsals, giving a more or less strongly pied effect to it, in which the light coloured grey or buff area may be less than half the whole.

In the Adelaide series the markings of the foot are not strongly developed and usually the entire dorsum is pale.

(4) The brush of the tail is better developed in the island animal and the black portion more extensive in relation to the grey, always covering more than half and sometimes three-quarters of its total length. In the mainland analogue it is frequently less than half the total length.

TABLE 2

	Kangaroo Island			Adelaide District and S. Mt. Lofty Range		
	7 Adult ♂	7 Adult ♀	♂+♀ Ad. (14 skulls)	5 Adult ♂	3 Adult ♀	♂+♀ Ad. (13 skulls) (5 not sexed)
Greatest length	85.8-91.5 (87.3)	84.0-86.0 (84.9)	84.0-91.5 (86.1)	83.0-86.5 (84.3)	80.0-80.0 (80.0)	80.0-86.5 (82.5)
Basal length	76.6-82.0 (78.5)	75.4-79.7 (78.4)	75.4-82.0 (78.4)	75.0-78.8 (75.9)	72.5-72.7 (72.6)	72.5-78.8 (74.9)
Zygomatic breadth	50.5-54.7 (52.2)	48.6-52.3 (50.4)	48.6-54.7 (51.3)	50.0-52.3 (51.0)	48.3-52.5 (50.3)	50.0-52.5 (51.0)
Nasals, length	33.4-36.3 (34.4)	50.0-52.9 (51.5)	30.0-36.3 (32.9)	30.3-34.5 (32.2)	28.2-32.4 (30.0)	28.2-34.5 (31.2)
Nasals, greatest breadth	14.0-16.1 (14.8)	13.8-15.8 (14.7)	13.8-16.1 (14.7)	14.5-15.7 (14.9)	14.1-16.3 (15.1)	14.1-17.0 (15.3)
Interorbital constriction	7.2-11.9 (9.9)	9.6-11.3 (10.2)	7.2-11.9 (10.0)	7.6-11.0 (9.4)	9.5-13.3 (10.8)	7.6-13.3 (10.0)
Palate length	45.0-47.1 (46.0)	43.8-46.4 (45.0)	43.8-47.4 (45.5)	41.5-44.5 (43.4)	40.8-42.0 (41.4)	40.8-44.5 (42.6)
Anterior palatal foramina	5.4-6.7 (6.1)	5.5-6.4 (5.9)	5.4-6.7 (6.0)	5.5-6.3 (6.1)	5.5-6.2 (5.9)	5.4-6.6 (6.0)
Basiscranial axis	24.7-26.9 (25.7)	25.3-27.1 (26.2)	24.7-27.1 (25.9)	23.5-27.0 (25.5)	20.9-23.8 (22.8)	20.9-28.0 (24.5)
Basifacial axis	51.2-55.2 (52.9)	48.8-53.1 (50.5)	48.8-55.2 (51.7)	47.5-52.2 (50.2)	48.3-51.4 (49.6)	47.5-52.2 (49.8)
Facial index	195-223 (208)	180-203 (193)	180-223 (200)	180-220 (197)	203-207 (205)	172-220 (196)
M <sup>1</sup> -3 <i>in situ</i>	14.6-15.7 (15.3)	14.4-15.2 (14.9)	14.4-15.7 (15.1)	13.8-14.6 (14.3)	13.1-13.4 (13.3)	13.1-14.6 (13.9)
pt	4.6-5.0 (4.7)	4.4-4.9 (4.6)	4.4-5.0 (4.6)	4.4-5.0 (4.7)	4.2-4.2 (4.2)	4.2-4.9 (4.5)

Range and approx. mean of cranial and dental dimensions of *Trichosurus vulpecula* from Kangaroo Island, and from Adelaide district and S. Mt. Lofty Range, South Australia.



## CRANIAL CHARACTERS

Seventeen dimensions and indices were examined in the two groups and the more conventional are summarized in Table 2. In absolute dimensions the ranges overlap in most items but the approximate means for the Kangaroo Island series are almost always higher, and in the chief longitudinal dimensions by 5.6 p.c.

The Kangaroo Island skull is generally narrower zygomatically, the breadth/greatest length ratio giving a mean of 59.5 as against 61.8 in the mainland skull and the nasal bones are also narrower with a breadth index of 44.7 as against 48.7. The interorbital breadth and length of anterior palatal foramina are also relatively slightly less.

A visual impression that the skull of the island animal was longer muzzled could not be substantiated by an appeal to the cranial index, except in the male group. The basisphenoid-presphenoid suture in almost all skulls examined was obscured by overlapping plates of the pterygoids, and as a substitute landmark in the determination of the index, the apex of the visible portion of the basisphenoid was used. Although this frequently coincides with the position of the suture, it proved a somewhat erratic feature, and the figures for the index and the originating axes are approximations only. An approximate rostral index derived from the length of nasals in relation to greatest length of skull confirmed a slightly increased length of muzzle in the Kangaroo Island males only — these are also slightly narrower in the muzzle.

In non-metrical characters, variation in both series is high, comparatively small age changes effecting considerable differences in general appearance, especially in the frontal and interorbital region; however, the differences detected metrically are often quite apparent visually. The foramen magnum in *T. v. raii* is decidedly larger both absolutely and relatively and is deeper from above downwards than in the Adelaide series.

## DENTITION

The upper molars and upper secators only were examined quantitatively, and the former provide one of the most useful and constant distinctions between the two series. In the Kangaroo Island race, the length of  $Ms^{1-3}$  *in situ* yields a range of values almost entirely above that for the mainland series and an approximate mean which is 8 p.c. higher.

O. Thomas (1888, p. 187) used the length of the molar rows in his key of characters differentiating "*T. vulpecula typicus*" on the one hand from *T. v. fuliginosus* and *T. caninus* on the other, the former having a length of  $Ms^{1-3}$  *in situ* of less than 14.5 mm. and the two latter more than 14.5 mm.<sup>6</sup> The mainland population from the Adelaide district here studied conforms approximately to Thomas's definition, giving a range for  $Ms^{1-3}$  of 13.1-14.6 (13.9) mm. in adult skulls; but the Kangaroo Island group (though much closer to that of the mainland in all other characters than to that of Tasmania) approximates the latter in its longer rows with a range of 14.4-15.7 (15.1).

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<sup>6</sup> The context and the dimensions in the table on p. 208 seem to indicate that the reference to  $Ms^{1-3}$  on p. 187 is a mistake for  $Ms^{1-3}$ .